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(54) **A locking device for an apparatus for applying surgical fasteners**

**Sperrvorrichtung für chirurgisches Klammergerät**

**Dispositif de verrouillage pour une agrafeuse chirurgicale**

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**EP-A- 0 514 139** **US-A- 4 607 636**

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## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

[0001] The present invention relates to devices for applying surgical fasteners, and more particularly to a locking mechanism for preventing premature or repeated firing of the surgical fastening apparatus.

#### 2. Background of the Prior Art

[0002] Surgical fastening devices for simultaneously applying an array of surgical staples or other types of fasteners are known in the art. Such devices are used for suturing body tissue such as, for example, intestinal and gastric walls with spaced parallel rows of longitudinally aligned staples. These surgical stapling devices reduce the time of wound closure in a surgical procedure.

[0003] Typically, these devices include a fastener cartridge disposed on one side of the tissue to be fastened, and an anvil assembly parallel to the fastener holder on the other side of the tissue to be fastened. The fastener cartridge is moved linearly towards the anvil assembly so that the tissue is clamped between them. The fasteners are driven from the fastener cartridge so that the ends of the fasteners pass through the tissue and are formed as they make contact with the anvil assembly, thereby producing an array of finished fasteners in the tissue. Optionally, the fastening apparatus may include a knife mechanism for creating an incision between rows of fasteners. The fasteners can be made of metal, non-absorbable polymers, or bioabsorbable polymers such as polyglycolide, polylactide, and copolymers thereof. In addition, the anvil surface may support a plurality of retainers for cooperatively engaging the fasteners after the fasteners pass through the tissue.

[0004] In common use are devices in which the fastener cartridge comprises a disposable cartridge removably mounted on a cartridge jaw for supporting and actuating the cartridge. The cartridge is disposable after a single use, i.e. after the fasteners are fired. The fastener device is reusable after reloading with a fresh cartridge, and is generally reusable in a subsequent surgical procedure after cleaning, sterilizing, and reloading. Also known in the art are disposable surgical fastener devices, in which the entire apparatus is disposed of after a single use. Examples of such surgical fastening devices may be found in, among others, Green (U.S. Patent No. 4,354,628), Green (US Patent No. 4,665,916). Specifically, Green US Patent No. 4,568,009 provides a basis for the pre-characterising part of claim 1 below.

[0005] In the use of surgical fastener devices the possibility arises that the fastener device may be actuated when the cartridge is empty of staples or fasteners. This

can occur when the apparatus has been fired once, but the cartridge has not been reloaded or discarded, and may also occur if the apparatus is inadvertently reloaded with a spent cartridge. Under such circumstances the fastening device will fail to suture the body tissue, which can cause harm to the patient due to the surgeon's loss of valuable time. The risk of harm is greatly increased if the apparatus contains a knife mechanism, since it will create an unsealed incision.

[0006] To eliminate these dangers to the patient it would be beneficial to provide a device which alerts the surgeon that a new cartridge is required. It would further be beneficial if such a device provides a locking mechanism to actually prevent the surgeon from trying to fire a cartridge that has already been fired and prevent approximation of the jaws should a spent cartridge be loaded into the cartridge jaw. This would save valuable time and reduce the risks to the patient.

EP-A-373762 and EP-A-399700 are two examples of instruments which include means to prevent firing of a spent cartridge. The safety feature, however, does not prevent the surgeon from, re-approximating the jaws of the instrument.

EP-A-489436 discloses a mechanism for applying a plurality of surgical fasteners to body tissue. A locking mechanism is included for preventing the re-approximation of the jaw members and thus re-firing of the apparatus after a cartridge is spent (i.e. the fasteners have been fired) and the cartridge jaw is withdrawn from the anvil jaw. The locking mechanism disclosed therein is constructed as part of the cartridge, and moreover, the locking mechanism is at least partially located inside of the cartridge. EP-A-489436 was not published until after the priority date declared herein.

[0007] While this development represented an advance in the surgical fastener art, it is further desirable to provide a locking device that is part of the jaw mechanism of a surgical fastening device in contrast to part of a cartridge that will prevent the re-approximation of a spent cartridge. A locking device that is part of a frame or jaw mechanism relieves a fastener cartridge from cumbersome locking mechanisms, and further, since the locking mechanism will not be disposed of with the cartridge when the cartridge is spent, there is a corresponding reduction in cost in assembly and manufacture.

#### SUMMARY OF THE INVENTION

[0008] The present invention is defined in claim 1. The invention provides a surgical fastening apparatus for applying a plurality of surgical fasteners to body tissue which includes means for advancing a first jaw member towards a second jaw member to grip tissue therebetween prior to driving the fasteners into the tissue. The apparatus further includes means pivotably mounted on one of said jaws for preventing the advancing means from moving the first jaw member towards the second

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jaw member in the event a spent cartridge is held in the cartridge jaw. When the fasteners are fired, the preventing means in one embodiment pivots upwardly into an area defined by the jaw member and vacated by the fastener drivers. As the handle mechanism is released, the cartridge jaw moves to its non-advanced (retracted) position, pivoting the means temporarily downwardly as it passes over the said means. The means then pivots back upwardly to engage a surface of the cartridge jaw, so that the first jaw member is thus prevented from advancing until a new cartridge is positioned for use in the apparatus. The positioning of the preventing means adjacent the second jaw member on the frame provides a means for preventing premature advancement of the first jaw member, and allows for use of a cartridge including the plurality of fasteners without a locking device integral with the cartridge.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The foregoing features of the present invention will become more readily apparent and may be understood by referring to the following detailed description of an illustrative embodiment of the locking device for use with a surgical fastening device of the present invention, taken in conjunction with the accompanying drawings, in which:

Figure 1 is an exploded perspective view with a partial cut away view illustrating a cartridge end of a jaw mechanism of a surgical fastening apparatus having the locking device according to a first embodiment of the present invention;

Figure 2 is a perspective view illustrating the locking device included in the first embodiment.

Figure 3 is a side elevational view in partial cut away illustrating the first embodiment of the present invention with the locking device in a non-engaged position prior to firing of the fasteners;

Figure 4 is a side elevational view in partial cut away illustrating the first embodiment during firing of the fasteners;

Figure 5 is a side elevational view of the Figure 1 embodiment in partial cut away illustrating the engaged locking device preventing the advancement of the cartridge jaw;

Figure 6 is a cross-sectional view of the jaw mechanism shown in Figure 5 taken along line 6-6;

Figure 7 is a perspective view illustrating the guide track portion of the jaw mechanism of the first embodiment;

Figure 8 is a perspective view illustrating a first alternative locking device;

Figure 9 is a perspective view illustrating a second alternative locking device;

Figure 10 is a side elevational view in partial cut away illustrating the first alternative locking device positioned on a jaw mechanism in a non-engaged

position of a surgical fastening apparatus according to a second embodiment of the present invention;

Figure 11 is a side elevational view in partial cut away illustrating the locking device of Figure 10 during firing of the fasteners; and

Figure 12 is a side elevational view in partial cut away illustrating the engaged locking device of Figures 10 and 11 preventing advancement of the cartridge jaw.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] Referring now in specific detail to the drawings, in which like reference numerals identify similar or identical elements throughout the several views, there is shown a jaw mechanism 10 having a locking device 27 which discourages or prevents the jaw mechanism 10 from becoming approximated into firing position when fasteners are not present in a cartridge 14.

[0011] A first embodiment of the locking device 27 used in a jaw mechanism 10 of a surgical fastening apparatus is shown in Figures 1 and 2 of the drawings. The jaw mechanism 10 of the surgical fastening apparatus includes a cartridge jaw member 12 designed and configured to accept a fastener cartridge 14 between jaw arms 12a and 12b. Cartridge 14 includes a plurality of fasteners and is provided with guide posts 24a and 24b which engage guide track 26 on frame portion 18. The proximal end of the first jaw member 12 is coupled to an approximating advancement member 22. An anvil jaw member 16 includes an anvil portion integral with a U-shaped frame portion 18. The proximal end of the U-shaped frame portion 18 is coupled to a body portion 19 of the surgical fastening apparatus.

[0012] A locking device 27 is pivotally attached to the U-shaped portion 18 as shown and includes locking member 28 and support member 30. Support member 30 includes spring arm 32 which biases locking member 28 upwardly into an engaged position. Locking member 28 is a generally H-shaped member, as seen in Figure 2, having a laterally extending abutment portion 34. The locking member 28 further includes a longitudinally extending body portion 38 having an articulation or bend 40 and a stepped laterally extending distal pivot post 36. The stepped distal post 36 is coupled to the U-shaped frame portion 18 at pivot point 44 (Figure 3). The locking device is constructed of a resilient material, and is pivoted upward by spring arm 32 of support member 30 when coupled to the U-shaped portion 18 to engage the underside of the cartridge 14 having the plurality of fasteners situated therein.

[0013] In use, the jaw mechanism 10 is operable following positioning body tissue between the fastener cartridge 14 and the anvil jaw 16 by actuating a handle mechanism and approximating mechanism to urge approximating member 20 distally, so that cartridge jaw 12 is pushed towards anvil jaw 16 to position the body

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tissue between cartridge jaw 12 and anvil jaw 16. After the surgical fasteners are driven into the tissue and the staple legs are crimped by the anvil jaw 16, the apparatus is returned to its rest position by releasing the handle mechanism and the approximating member 20 is moved proximally with cartridge jaw 12, away from anvil jaw 16, thereby releasing the body tissue.

[0014] As shown in Figure 3, the jaw mechanism 10 is in an at rest position. The fastener cartridge 14, holding a plurality of fasteners, is positioned in cartridge jaw 12. The locking member 28 abuts the underside of cartridge 14 at fastener drivers 42 and is pivoted downwardly out of engagement by drivers 42, against biasing spring arm 32 of support 30.

[0015] Referring to Figure 4, the jaw mechanism 10 is shown in an approximated position with the cartridge 14 adjacent anvil jaw 16. The jaw mechanism 10 is moved to this position by actuating an approximating mechanism to move approximating member 20 to forwardly advance cartridge jaw 12. A handle mechanism (not shown) is actuated to drive actuating member 22 through cartridge jaw 12 toward the distal end of the apparatus. Actuating member 22 drives fastener drivers 42 into the fasteners to force the fasteners into the tissue. After firing, the fastener drivers 42 remain in a distal position so the locking member 28 is allowed to be pivoted upwardly about pivot point 44 by spring arm 32 as shown into the interior space between jaw arms 12a and 12b so that bend 40 of body portion 38 is positioned between jaw arms 12a and 12b of jaw member 12.

[0016] As shown in Figure 5, after the fasteners are applied to the tissue, jaw mechanism 10 is returned to the position of Figure 3 by releasing the handle members and the approximating mechanism so that actuating member 22 and approximating member 20 move towards the proximal end of the apparatus. Locking member 28, resiliently extended upward between jaw arms 12a and 12b, is pivoted downwardly to allow cartridge jaw 12 to pass over it and then back upwardly to engage a notch 46 integral with the proximal end of cartridge jaw 12. Thus, the actuating member 22 and approximating member 20 cannot be driven distally to approximate cartridge jaw 12 towards anvil jaw 16 when the fasteners are not in the cartridge.

[0017] Referring to Figures 6 and 7, there is shown the guide track 26 of the U-shaped portion 18 upon which cartridge 14 rides. The guide track 26 of U-shaped portion 18 is designed to cooperate with guide posts 24a and 24b of cartridge 14 to properly align cartridge 14 during advancement and firing. Guide track 26 has a substantially T-shaped configuration and includes a stepped portion 48 to facilitate loading of the cartridge 14 thereon.

[0018] The locking device of the present invention enables the apparatus to be fired only once in a single use, by preventing reapproximation of the cartridge after the fasteners have been fired and the jaw mechanism is retracted to its non-engaged position. The apparatus

can be refired by substituting a new cartridge loaded with fasteners to pivot the locking device 28 out of engagement. If the jaw mechanism is mistakenly reloaded with a spent (already fired) cartridge, the locking device will prevent approximation of the cartridge, since the fastener drivers will not bias the locking member out of engagement with the cartridge jaw, and thereby not allow the instrument to be fired.

[0019] Another embodiment of the locking member is shown in Figure 8. Locking member 50 includes a generally triangular body portion 56 and a spring member 60 which is preferably, for example, spot welded to the triangular body portion 56. The triangular body portion 56 includes an abutment surface 54 at a mid-point for engaging notch 66 as best seen in Figure 12. A laterally extending pivot post at a distal end is positionable at a proximal end of the jaw mechanism 10 in pivot point 64.

[0020] A further embodiment of the locking member is shown in Figure 9. Locking member 62 is similar to locking member 50 above in construction as shown.

[0021] Referring now to Figures 10-12, jaw mechanism 10 of the surgical fastening apparatus is shown incorporating either locking member 50 or 62. Jaw mechanism 10 includes cartridge jaw 12 and anvil jaw 16 as in the previous embodiment shown in Figures 1-7. However, in the embodiment shown in Figures 10-12, locking member 50 is pivotably attached to the proximal side of U-shaped portion 18 at pivot point 64. Spring portion 60 biases locking member 50 upwardly to engage the underside of cartridge 14 as shown in Figure 10, which shows jaw mechanism 10 in an at rest position. Similar to Figures 4 and 5 discussed above, Figure 11 shows the jaw mechanism 10 in an engaged position with locking device 50 resiliently extending upward following approximation of jaw members 12 and 16.

Subsequent to firing the fasteners, the jaw mechanism 10 is moved proximally over locking member 50 to pivot member 50 downwardly and then upwardly to engage notch 66 and allow the body portion of locking member 50 to be positioned within the space defined by jaw arms 12a and 12b of cartridge jaw 12.

[0022] The term "fasteners" is used herein as a generic term which includes surgical staples, and the staple-shaped portion of two-part surgical fasteners, and equivalence thereof. It is further understood that the fasteners described herein are applicable to instruments for applying metal staples, as well as staples and two-part fasteners made from non-bioabsorbable or from bioabsorbable polymers (e.g. polyglycolide, polylactide and copolymers thereof).

#### Claims

1. Surgical fastening apparatus having a first jaw (12) containing a disposable cartridge (14) having a plurality of fasteners, a second jaw (16) opposite said first jaw, means (20) for advancing and retracting

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one of said jaws towards said other jaw, and means (22) for driving said fasteners from said cartridge after advancement of one of said jaws, and characterised by

means (28, 54) pivotably mounted on one of said jaws for preventing advancement of said jaws towards said opposing jaw after driving of said fasteners and retraction of said jaw, and before replacement of the spent cartridge.

2. Apparatus according to claim 1, wherein said preventing means (28, 54) comprises a pivotable locking member (28, 54) pivotable between first and second positions and wherein said locking member engages said first jaw in said second position.
3. Apparatus according to claim 1 or 2, wherein said locking member is spring biased (32, 60) to said second position.
4. Apparatus according to claim 1, 2 or 3 wherein said first jaw has a tooth portion (46) engaging said locking member when in said second position.
5. Surgical fastening apparatus as claimed in any one of the preceding claims and including cartridge guide means (26) positioned on said second jaw member and engaging said cartridge to guide said cartridge into alignment with an anvil surface on said second jaw member.
6. Apparatus according to claim 5, wherein said guide means comprises a T-shaped track member (26) secured to said second jaw member (16) co-operating with a complementary-shaped channel portion (24a, 24b) in said cartridge, said channel engaging said track member during approximation of said first jaw member.
7. Apparatus as claimed in any one of the preceding claims, and comprising a jaw mechanism (10) including the first jaw (12) with cartridge (14) containing a plurality of fasteners and the second jaw (16), the advancing means (20) for approximating one of said jaw members toward said other jaw member to grip tissue therebetween, the driving means (22) driving said fasteners distally from said cartridge into said tissue, and a locking device (27, 50, 62) which is movable from a non-engaged position prior to driving said fasteners from said cartridge to an engaged position subsequent to driving said fasteners, said locking device permitting proximal movement of said advancing means, and impeding distal movement of said advancing means after said fasteners have been driven from said cartridge,

the locking device comprising said advancement-preventing means (28, 54), positioned on said

second jaw member and pivotable from said non-engaged position to said engaged position for engaging said advancing means.

8. Apparatus according to claim 7, wherein said biasing means comprises a leaf spring member (32, 60) coupled to said engaging means positioned in contact with said second jaw to pivot said engaging means into said engaged position.
9. Apparatus according to claim 7 or 8, the locking means further comprising a support member, said support member being secured to said second jaw and including a spring arm (32, 60) for biasing said engaging means into said engaged position.
10. Apparatus according to any one of the preceding claims, wherein said cartridge containing said plurality of fasteners further contains a fastener driving member (22) for driving said fasteners from said cartridge, said driving member contacting said engaging means (28, 54) to pivot said engaging means into said non-engaged position when said fasteners are contained within said cartridge.
11. Apparatus according to any one of the preceding claims wherein said advancement-preventing means (28) comprises a substantially H-shaped member, a first leg of said H-shaped member engaging said second jaw to pivot said H-shaped member about an aperture in said second jaw, and a second leg of said H-shaped member comprising a blocking member for engaging said advancing means to impede distal movement of said advancing means after said fasteners have been driven from said cartridge.
12. Apparatus according to any one of the preceding claims wherein said second jaw (16) has a substantially U-shape portion, said advancement-preventing means being positioned on a base portion of said U-shape portion beneath said cartridge.
13. Apparatus according to any one of claims 1 to 12 wherein said second jaw (16) comprises a substantially U-shaped portion, said advancement-preventing means being positioned on a proximal side of said U-shape portion.
14. Apparatus according to any one of the preceding claims wherein said first jaw comprises a pair of jaw arms having a slot therebetween for accepting said cartridge, said advancement-preventing means engaging said first jaw between said arms after said fasteners have been driven from said cartridge.
15. Apparatus according to any one of the preceding claims wherein said advancement-preventing

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means (28, 54) engages said advancing means (20) to prevent distal movement of said advancing means when said cartridge is removed from said first jaw.

16. Apparatus according to claim 5, or any one of claims 6 to 15 as dependent on claim 5, wherein said cartridge guide means (26) comprises a T-shaped track member secured to said second jaw cooperating with a complementary shaped channel portion in said cartridge, said channel engaging said track member during approximation of said first jaw.
17. Apparatus according to any one of the preceding claims wherein said advancement-preventing means (54) comprises a leaf spring having a first leg (58) for engaging said second jaw to pivot said engaging means about an aperture in said second jaw, and a second leg (56) having an abutment portion (54) for engaging said advancing means to impede distal movement of said advancing means and said first jaw after said fasteners have been driven from said cartridge.

#### Patentansprüche

1. Chirurgische Befestigungsvorrichtung mit einer ersten Klemmbacke (12), die ein entsorgbares Magazin (14) mit einer Mehrzahl von Befestigern besitzt, enthält, eine zweite Klemmbacke (16) gegenüberliegend der ersten Klemmbacke, eine Einrichtung (20), um eine der Klemmbacken in Richtung der anderen Klemmbacke vorzurücken und zurückzuziehen, und eine Einrichtung (22), um die Befestiger von dem Magazin nach dem Vorrücken einer der Klemmbacken auszutreiben, und gekennzeichnet durch eine Einrichtung (28, 54), die schwenkbar auf einer der Klemmbacken montiert ist, um das Vorrücken der Klemmbacke in Richtung der gegenüberliegenden Klemmbacke nach dem Austreiben der Befestiger und dem Zurückziehen der Klemmbacke und vor dem Ersetzen des verbrauchten Magazins zu verhindern.
2. Vorrichtung gemäß Anspruch 1, wobei die Einrichtung zum Verhindern (28, 54) ein schwenkbares Sperrelement (28, 54) umfasst, das zwischen ersten und zweiten Positionen schwenkbar ist, und wobei das Sperrelement mit der ersten Klemmbacke in der zweiten Position in Eingriff tritt.
3. Vorrichtung gemäß Anspruch 1 oder 2, wobei das Sperrelement in die zweite Position federbelastet (32, 60) ist.
4. Vorrichtung gemäß Anspruch 1, 2 oder 3, wobei die erste Klemmbacke einen Zahnbereich (46) besitzt, der mit dem Sperrelement in Eingriff tritt, wenn dieses in der zweiten Position ist.
5. Chirurgische Befestigungsvorrichtung gemäß einem der vorhergehenden Ansprüche und umfassend eine Magazinführungseinrichtung (26), die auf dem zweiten Klemmbackenelement angeordnet ist und mit dem Magazin in Eingriff tritt, um das Magazin in Ausrichtung mit einer Anschlagoberfläche auf dem zweiten Klemmbackenelement zu führen.
6. Vorrichtung gemäß Anspruch 5, wobei die Führungseinrichtung ein T-förmiges Schienenelement (26) umfasst, das am zweiten Klemmbackenelement (16) befestigt ist und mit einem komplementär geformten Innenbereich (24a, 24b) im Magazin zusammenzuwirkt, wobei die Rinne während des Annäherns des ersten Klemmbackenelementes mit dem Schienenelement in Eingriff tritt.
7. Vorrichtung gemäß einem der vorhergehenden Ansprüche und umfassend einen Klemmbackenmechanismus (10) mit einer ersten Klemmbacke (12) mit einem Magazin (14), das eine Mehrzahl von Befestigern enthält, und die zweite Klemmbacke (16), die Einrichtung (20) zum Vorrücken, um eines der Klemmbackenelemente in Richtung der anderen Klemmbacke zum Greifen von Gewebe dazwischen anzunähern, die Einrichtung (22) zum Eintreiben, um die Befestiger in distaler Richtung von dem Magazin in das Gewebe einzutreiben, und eine Sperreinrichtung (27, 50, 62), die von einer Nichteingriffsposition vor dem Eintreiben der Befestiger von dem Magazin zu einer Eingriffsposition nachfolgend dem Eintreiben der Befestiger bewegbar ist, wobei die Sperreinrichtung eine proximale Bewegung der Einrichtung zum Vorrücken erlaubt und eine distale Bewegung der Einrichtung zum Vorrücken behindert, nachdem die Befestiger von dem Magazin eingetrieben worden sind, wobei die Sperreinrichtung die Einrichtung zum Verhindern des Vorrückens (28, 54) umfasst, die auf dem zweiten Klemmbackenelement positioniert ist und von der Nichteingriffsposition in die Eingriffsposition zum in Eingrifftreten mit der Einrichtung zum Vorrichtung verschwenkbar ist.
8. Vorrichtung gemäß Anspruch 7, wobei die Einrichtung zum Vorspannen ein Blattfederelement (32, 60) umfasst, das mit der Eingriffseinrichtung gekoppelt ist, die in Kontakt mit der zweiten Klemmbacke positioniert ist, um die Eingriffseinrichtung in die Eingriffsposition zu verschwenken.
9. Vorrichtung gemäß Anspruch 7 oder 8, wobei die Sperreinrichtung weiterhin ein Halteelement

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umfasst, das an der zweiten Klemmbacke befestigt ist und einen Federarm (32, 60) aufweist, um die Eingriffseinrichtung in die Eingriffsposition vorzuspannen.

10. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei das Magazin, welches die Mehrzahl von Befestigern enthält, weiterhin ein Befestigereintreibelement (22) enthält, um die Befestiger von dem Magazin einzutreiben, wobei das Eintreibelement die Eingriffseinrichtung (28, 54) berührt, um die Eingriffseinrichtung in die Nichteingriffsposition zu verschwenken, wenn die Befestiger in dem Magazin enthalten sind.

11. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die Einrichtung (28) zum Verhindern des Vorrückens ein im Wesentlichen H-förmiges Element umfasst, wobei ein erstes Bein des H-förmigen Elementes in Eingriff tritt mit der zweiten Klemmbacke, um das H-förmige Element um eine Öffnung in der zweiten Klemmbacke zu verschwenken, und ein zweites Bein des H-förmigen Elementes ein Blockierelement umfasst, um in Eingriff zu treten mit der Vorrückeneinrichtung, um eine distale Bewegung der Vorrückeneinrichtung zu verhindern, nachdem die Befestiger aus dem Magazin getrieben worden sind.

12. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die zweite Klemmbacke (16) einen im Wesentlichen U-förmigen Bereich besitzt, und die Einrichtung zum Verhindern des Vorrückens auf einem Grundbereich des U-förmigen Bereichs unter dem Magazin angeordnet ist.

13. Vorrichtung gemäß einem der Ansprüche 1 bis 12, wobei die zweite Klemmbacke (16) einen im Wesentlichen U-förmigen Bereich umfasst und die Einrichtung zum Verhindern des Vorrückens auf einer proximalen Seite des U-förmigen Bereichs positioniert ist.

14. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die erste Klemmbacke ein Paar von Klemmbackenarmen umfasst, mit einem Schlitz zwischen diesen, um das Magazin aufzunehmen, und die Einrichtung zum Verhindern des Vorrückens in die erste Klemmbacke zwischen den Armen einrückt, nachdem die Befestiger aus dem Magazin getrieben worden sind.

15. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die Einrichtung zum Verhindern des Vorrückens (28, 54) in Eingriff tritt mit der Vorrückeneinrichtung (20), um eine distale Bewegung der Vorrückeneinrichtung zu verhindern, wenn das Magazin von der ersten Klemmbacke entfernt ist.

16. Vorrichtung gemäß Anspruch 5 oder einem der Ansprüche 6 bis 15, sofern diese von Anspruch 5 abhängig sind, wobei die Einrichtung (26) zu Führen des Magazins ein T-förmiges Schienenelement umfasst, das an der zweiten Klemmbacke befestigt ist und mit einem komplementär geformten Rinnenbereich in dem Magazin zusammenwirkt, wobei die Rinne mit dem Schienenelement während des Annäherns der ersten Klemmbacke in Eingriff tritt.

17. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die Einrichtung (54) zum Verhindern des Vorrückens eine Blattfeder umfasst mit einem ersten Bein (58), um in Eingriff zu treten mit der zweiten Klemmbacke, um die Eingriffseinrichtung um eine Öffnung der zweiten Klemmbacke zu verschwenken, und ein zweites Bein (56) mit einem Anschlagbereich (54), um in Eingriff zu treten mit der Vorrückeneinrichtung, um eine distale Bewegung der Vorrückeneinrichtung und der ersten Klemmbacke zu behindern, nachdem die Befestiger von dem Magazin getrieben worden sind.

#### Revendications

- Appareil d'attachement chirurgical comportant une première mâchoire (12) contenant une cartouche jetable (14) comportant une pluralité d'attaches, une seconde mâchoire (16) opposée à ladite première mâchoire, un moyen (20) pour faire avancer et rétracter l'une desdites mâchoires vers l'autre desdites mâchoires et un moyen (22) pour entraîner lesdites attaches de ladite cartouche après l'avance d'une desdites mâchoires, et caractérisé par un moyen (28, 54) installé d'une manière pivotante sur l'une desdites mâchoires pour empêcher l'avancement desdites mâchoires vers ladite mâchoire opposée après l'entraînement desdites attaches et le retrait de ladite mâchoire, et avant le remplacement de la cartouche vide.
- Appareil selon la revendication 1, où ledit moyen d'empêchement (28, 54) comprend un élément de verrouillage pivotant (28, 54) apte à pivoter entre des première et seconde positions, et où ledit élément de verrouillage vient en prise avec ladite première mâchoire dans ladite seconde position.
- Appareil selon la revendication 1 ou 2, où ledit élément de verrouillage est sollicité élastiquement (32, 60) à ladite seconde position.
- Appareil selon la revendication 1, 2 ou 3, où ladite première mâchoire comporte une portion dentée (46) venant en prise avec ledit élément de verrouillage lorsqu'il se trouve dans ladite seconde position.

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5. Appareil d'attachement chirurgical selon l'une des revendications précédentes, et incluant un moyen de guidage de cartouche (26) positionné sur ledit second élément de mâchoire et venant en prise avec ladite cartouche pour guider ladite cartouche en alignement avec une surface d'endume sur ledit second élément de mâchoire. 5
6. Appareil selon la revendication 5, où ledit moyen de guidage comprend un élément de chemin en forme de T (26) fixé audit second élément de mâchoire (16), coopérant avec une portion de canal de forme complémentaire (24a, 24b) dans ladite cartouche, ledit canal venant en prise avec ledit élément de chemin pendant l'approche dudit premier élément de mâchoire. 10 15
7. Appareil selon l'une des revendications précédentes, et comprenant un mécanisme de mâchoire (10) comportant la première mâchoire (12) avec la cartouche (14) contenant une pluralité d'attaches et la seconde mâchoire (16), le moyen d'avancement (20) pour approcher l'un desdits éléments de mâchoire vers ledit autre élément de mâchoire pour saisir le tissu entre ceux-ci, le moyen d'entraînement (22) entraînant lesdites attaches distalement de ladite cartouche dans ledit tissu, et un dispositif de verrouillage (27, 50, 62) qui est déplaçable d'une position de non-engagement avant l'entraînement desdites attaches depuis ladite cartouche à une position d'engagement à la suite de l'entraînement desdites attaches, ledit dispositif de verrouillage permettant un mouvement proximal dudit moyen d'avancement et empêchant un mouvement distal dudit moyen d'avancement après que lesdites attaches ont été entraînées depuis ladite cartouche, le dispositif de verrouillage comprenant ledit moyen empêchant l'avancement (28, 54), positionné sur ledit second élément de mâchoire et pouvant être amené à pivoter de ladite position de non-engagement à ladite position d'engagement pour venir en prise avec ledit moyen d'avancement. 20 25 30 35 40
8. Appareil selon la revendication 7, où ledit moyen de sollicitation comprend un élément de ressort à lames (32, 60) accouplé audit moyen d'engagement, positionné en contact avec ladite seconde mâchoire pour faire pivoter ledit moyen d'engagement dans ladite position engagée. 45 50
9. Appareil selon la revendication 7 ou 8, où ledit moyen de verrouillage comprend en outre un élément de support, ledit élément de support étant fixé à ladite seconde mâchoire et incluant un bras élastique (32, 60) pour solliciter ledit moyen d'engagement dans ladite position engagée. 55
10. Appareil selon l'une des revendications précédentes, où ladite cartouche contenant ladite pluralité d'attaches contient en outre un élément d'entraînement d'attaches (22) pour entraîner lesdites attaches depuis ladite cartouche, ledit élément d'entraînement venant en contact avec ledit moyen d'engagement (28, 54) pour faire pivoter ledit moyen d'engagement dans ladite position de non-engagement lorsque lesdites attaches sont contenues dans ladite cartouche.
11. Appareil selon l'une des revendications précédentes, où ledit moyen empêchant l'avancement (28) comprend un élément configuré sensiblement en H, une première branche dudit élément configuré en H venant en prise avec ladite seconde mâchoire pour faire pivoter ledit élément configuré en H autour d'une ouverture dans ladite seconde mâchoire; et une seconde branche dudit élément configuré en H comprenant un élément de verrouillage pour venir en prise avec ledit moyen d'avancement pour empêcher un mouvement distal dudit moyen d'avancement après que lesdites attaches ont été entraînées depuis ladite cartouche.
12. Appareil selon l'une des revendications précédentes, où ladite seconde mâchoire (16) a une portion sensiblement en U, ledit moyen empêchant l'avancement étant positionné sur une portion de base de ladite portion en U en dessous de ladite cartouche.
13. Appareil selon l'une des revendications 1 à 12, où ladite seconde mâchoire (16) comprend une portion sensiblement en U, ledit moyen empêchant l'avancement étant positionné sur un côté proximal de ladite portion en forme de U.
14. Appareil selon l'une des revendications précédentes, où ladite première mâchoire comprend une paire de bras de mâchoire ayant une fente entre ceux-ci pour accepter ladite cartouche, ledit moyen empêchant l'avancement venant en prise avec ladite première mâchoire entre lesdits bras après que lesdites attaches ont été entraînées depuis ladite cartouche.
15. Appareil selon l'une des revendications précédentes, où ledit moyen empêchant l'avancement (28, 54) vient en prise avec ledit moyen d'avancement (20) pour empêcher un mouvement distal dudit moyen d'avancement lorsque ladite cartouche est retirée de ladite première mâchoire.
16. Appareil selon la revendication 5 ou l'une des revendications 6 à 15 dépendant de la revendication 5, où ledit moyen de guidage de cartouche (26) comprend un élément de chemin en forme de T fixé à ladite seconde mâchoire coopérant avec une portion de canal de forme complémentaire dans ladite



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cartouche, ledit canal venant en prise avec ledit élément de chemin pendant l'approche de ladite première mâchoire.

17. Appareil selon l'une des revendications précédentes, où ledit moyen empêchant l'avancement (54) comprend un ressort à lames comportant une première branche (58) pour venir en prise avec ladite seconde mâchoire pour faire pivoter ledit moyen d'engagement autour d'une ouverture dans ladite seconde mâchoire, et une seconde branche (56) comportant une portion de butée (54) pour venir en prise avec ledit moyen d'avancement afin d'empêcher un mouvement distal dudit moyen d'avancement et de ladite première mâchoire après que lesdites attaches ont été chassées de ladite cartouche.

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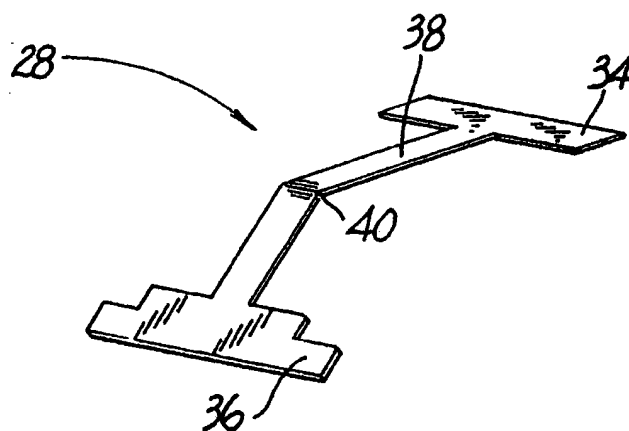
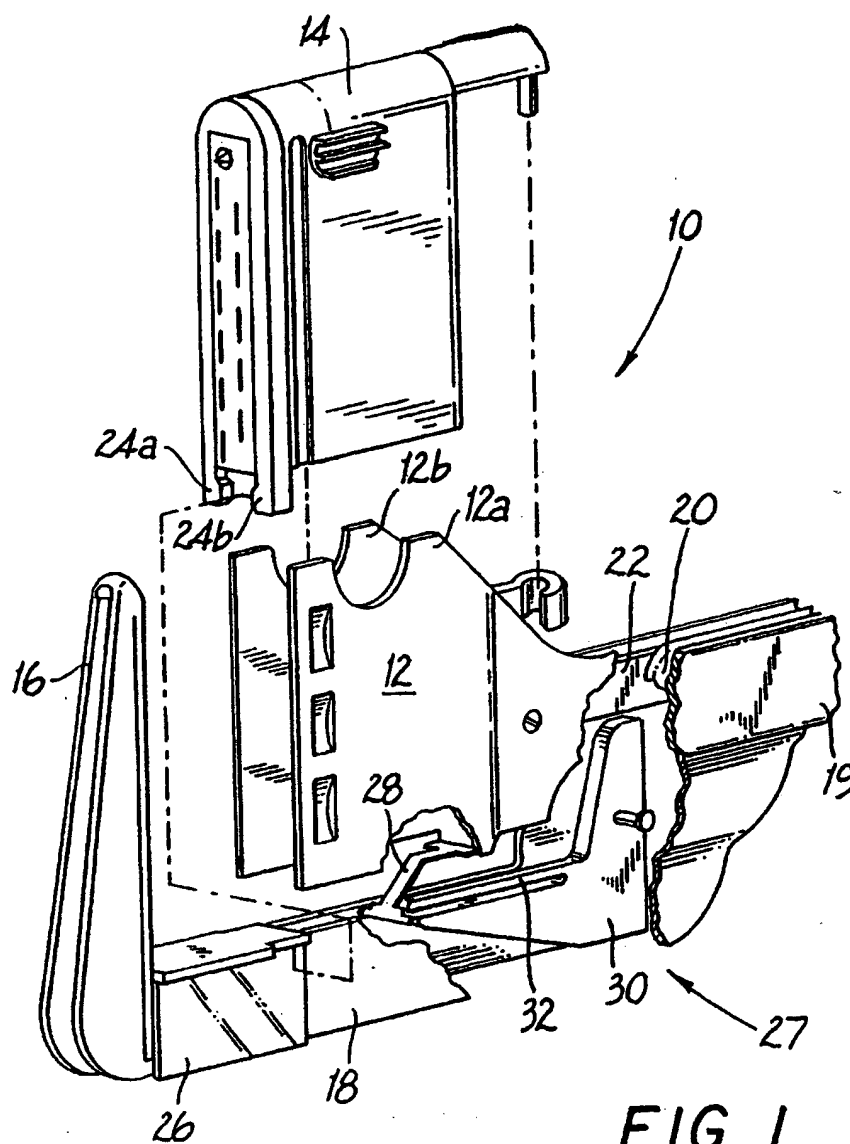
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FIG. 3

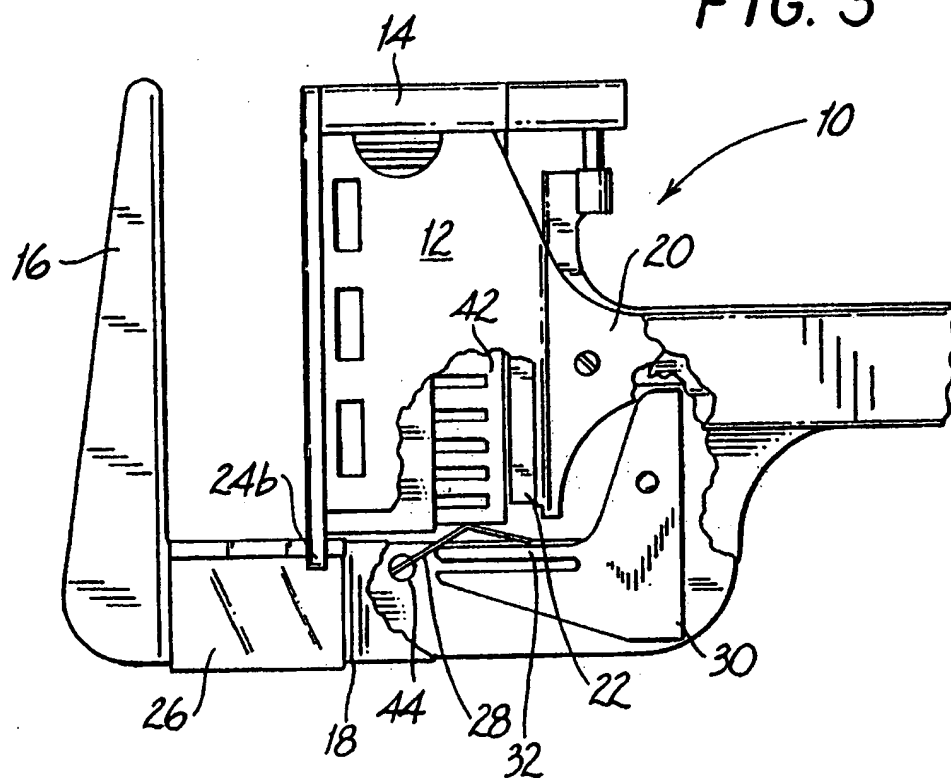
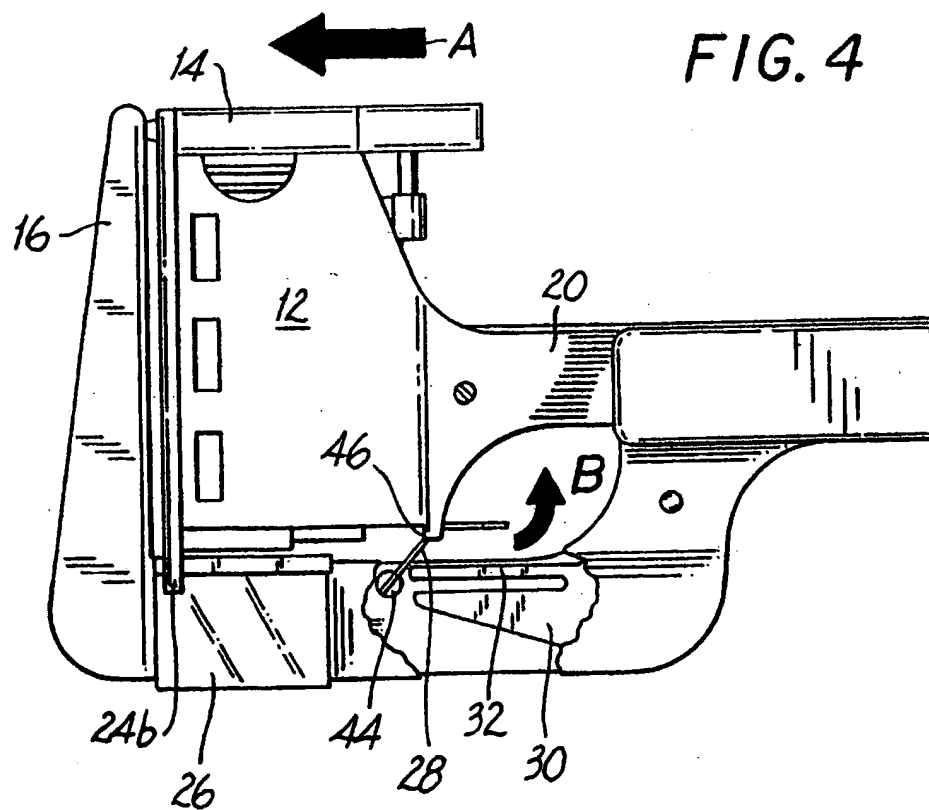
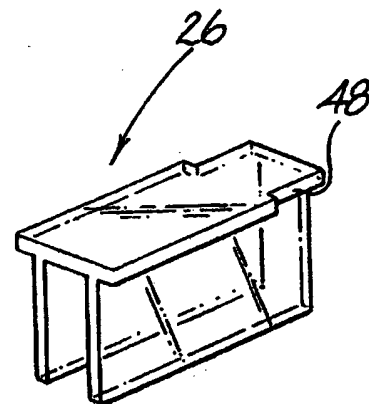
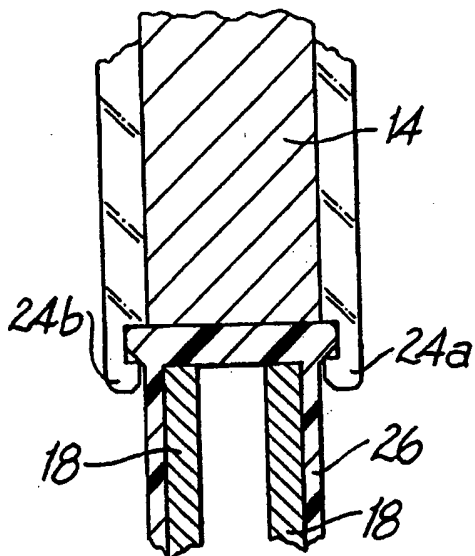
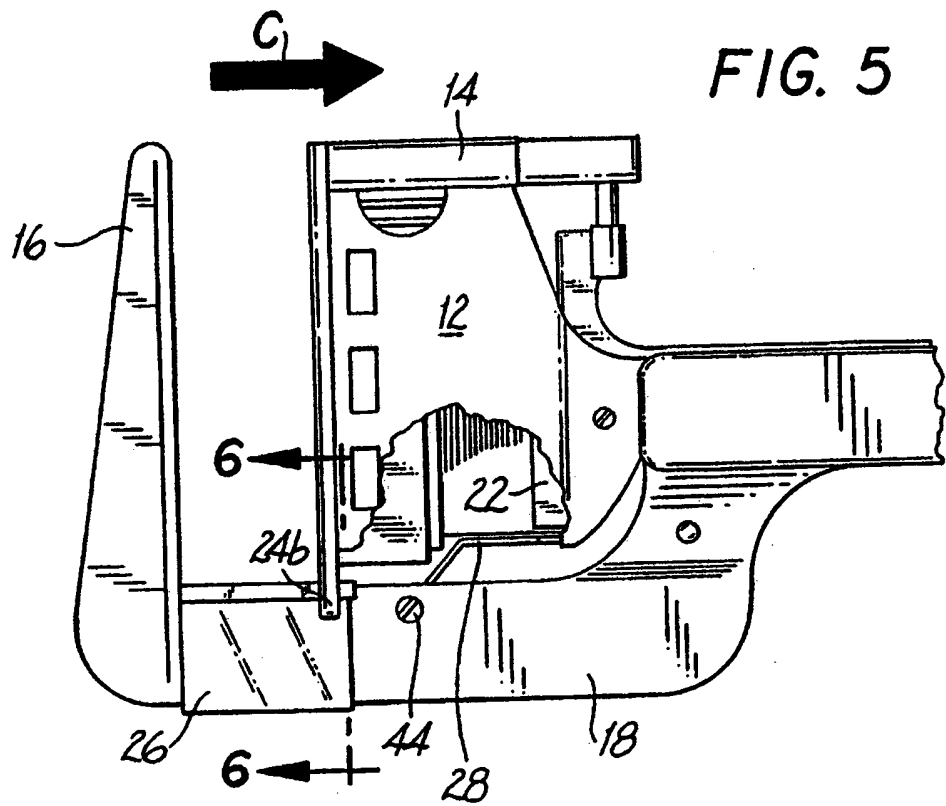


FIG. 4



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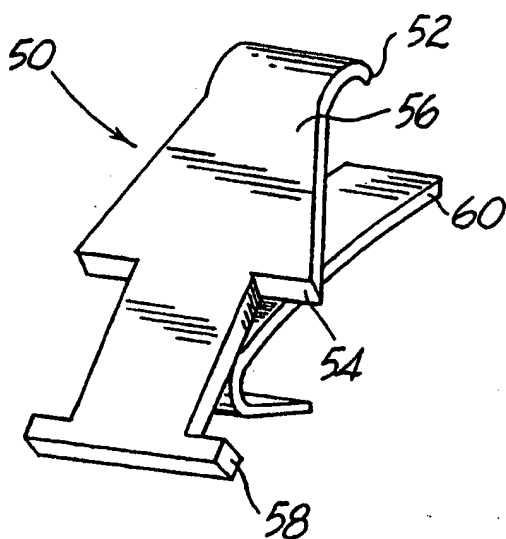


FIG. 8

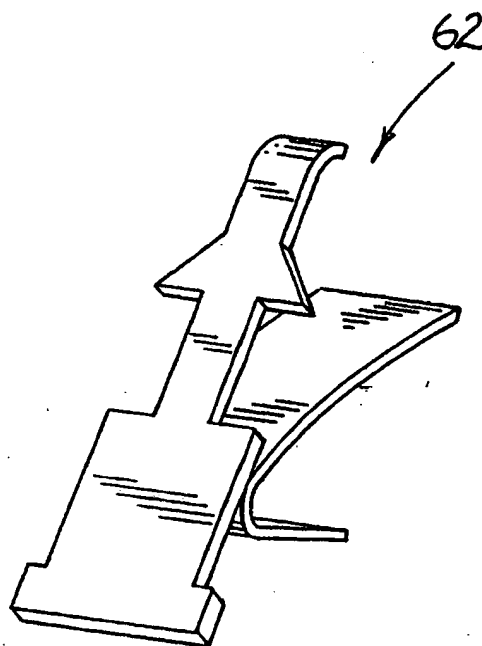


FIG. 9

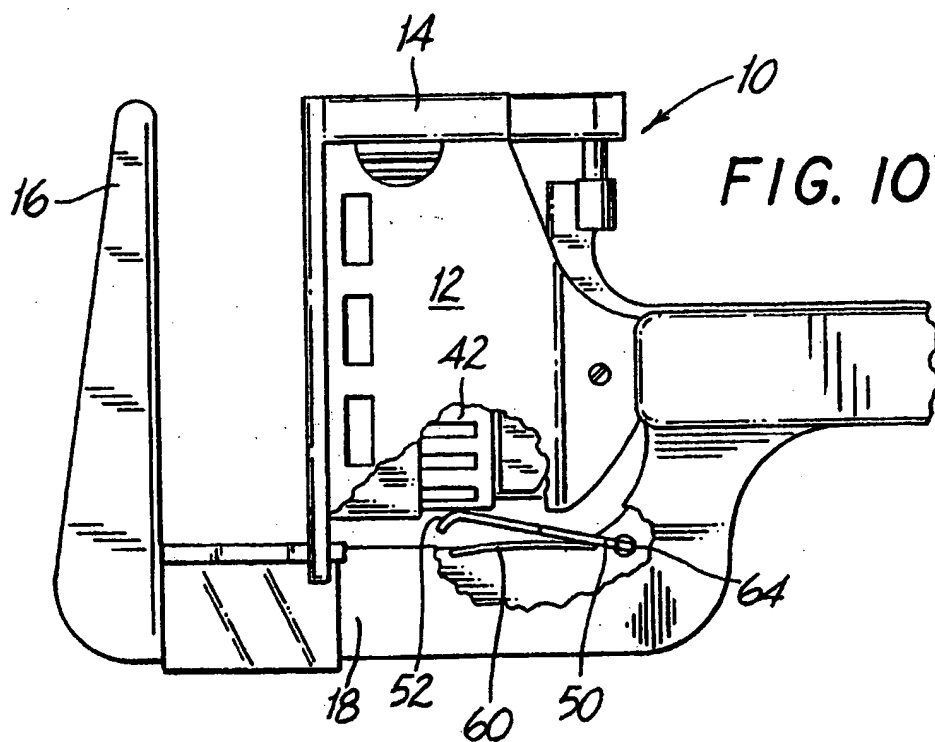


FIG. 10

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